S.Q. TUBE

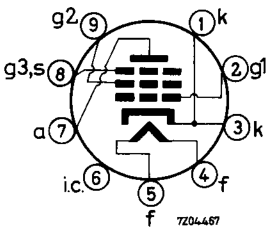
Special quality pentode designed for use as wide band amplifier.

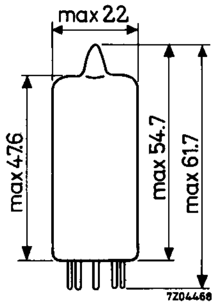
QUICK REFERENCE DATA			
Life test	10 000 hours		
Low interface resistance			
Mechanical quality	Shock and vibration resistant		
Base	Noval. Gold plated pins		
Heating	Indirect A.C. or D.C.; Parallel supply		
Heater voltage	V_f	6.3	V
Heater current	I_f	315	mA
Anode current	I_a	20	mA
Transconductance	S	26	mA/V
Equivalent noise resistance	R_{eq}	220	Ω

DIMENSIONS AND CONNECTIONS

Dimensions in mm

Base: Noval





CHARACTERISTICS

Column I Nominal value or setting of the tube
II Range values for equipment design: Initial spread
III Range values for equipment design: End of life

		I	II	III	
Heater voltage	V_f	6.3			V
Heater current	I_f	315	299 - 331		mA
Anode supply voltage	V_{ba}	190			V
Grid No.2 supply voltage	V_{bg_2}	160			V
Grid No.3 voltage	V_{g_3}	0			V
Grid No.1 supply voltage	$+V_{bg_1}$	8			V
Cathode resistor	R_k	370			Ω
Anode current	I_a	20	18.8-21.2	min. 17	mA
Grid No.2 current	I_{g_2}	6	5.3 - 6.7		mA
Mutual conductance	S	26	22 - 30	min. 17.5	mA/V
Internal resistance	R_i	100			kΩ
Amplification factor	μ_{g2g1}	60			
Negative grid current	$-I_{g_1}$		max. 0.3	max. 1.0	μA
Equivalent noise resistance	R_{eq}	220			Ω
Input resistance	r_{g_1}	1.4			kΩ
Pin 1 connected to pin 3					
Frequency 100 MHz					
S/C		2.2			mA/V/pF
$S/2\pi(C_g + C_a + 5\ pF)$		180			MHz
Anode supply voltage	V_{ba}	180			V
Grid No.2 supply voltage	V_{bg_2}	150			V
Grid No.3 voltage	V_{g_3}	0			V
Cathode resistor	R_k	80			Ω
Anode current	I_a	17			mA
Grid No.2 current	I_{g_2}	5.1			mA
Mutual conductance	S	24.5			mA/V

CHARACTERISTICS (continued)

As triode (grid No.2 connected to anode, grid No.3 connected to cathode)

		I	
Anode supply voltage	V_a	160	V
Grid No.1 supply voltage	$+V_{bg_1}$	8	V
Cathode resistor	R_k	400	Ω
Anode current	I_a	24	mA
Mutual conductance	S	33	mA/V
Internal resistance	R_i	1.8	kΩ
Amplification factor	μ	60	
Equivalent noise resistance	R_{eq}	100	Ω

CAPACITANCES

		Without external shield		With external shield		
		I	II	I	II	
Grid No.1 to grid No.2, grid No.3, cathode, heater and screen	C_{g_1/g_2g_3kfs}	9.3	8.3-10.3	9.4	8.4-10.4	pF
Anode to grid No.2, grid No.3, cathode, heater and screen	C_{a/g_2g_3kfs}	2.6	2.3- 2.9	3.6	3.2- 4.0	pF
Anode to grid No.1	C_{ag_1}		max. 35		max. 30	mpF
Grid No.1 to grid No.2, grid No.3, cathode, heater and screen Cathode current I_k = 26 mA	C_{g_1/g_2g_3kfs}	15.5		15.6		pF

SHOCK AND VIBRATION RESISTANCE

The following test conditions are applied to assess the mechanical quality of the tube. These conditions are not intended to be used as normal operating conditions.

Shock

The tube is subjected 5 times in each of 4 positions to an acceleration of 500 g supplied by an NRL shock machine with the hammer lifted over an angle of 30°.

Vibration

The tube is subjected during 32 hours in each of 3 positions to a vibration frequency of 50 Hz with an acceleration of 2.5 g.

LIFE

Production samples are tested to be within the end of life values (column III) during 10 000 hours.

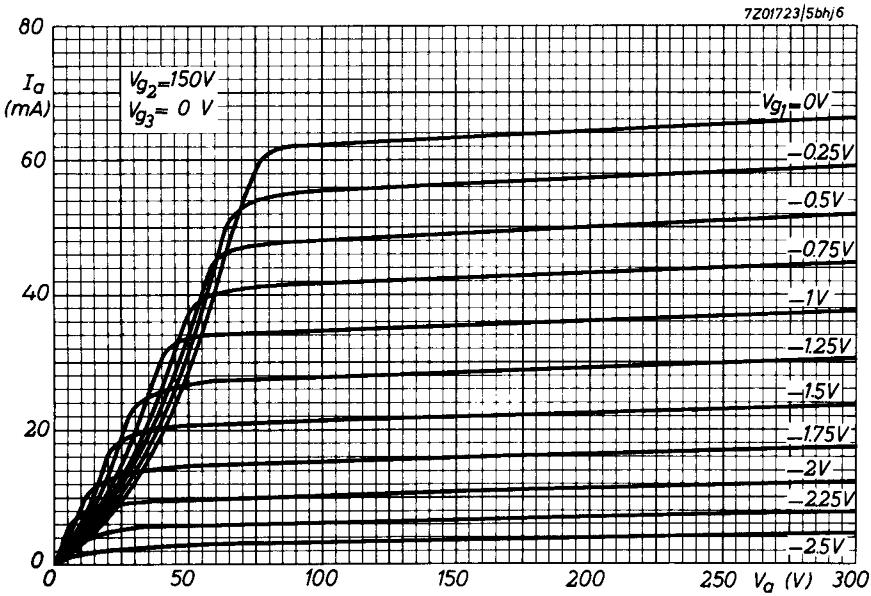
LIMITING VALUES (Absolute max. rating system)

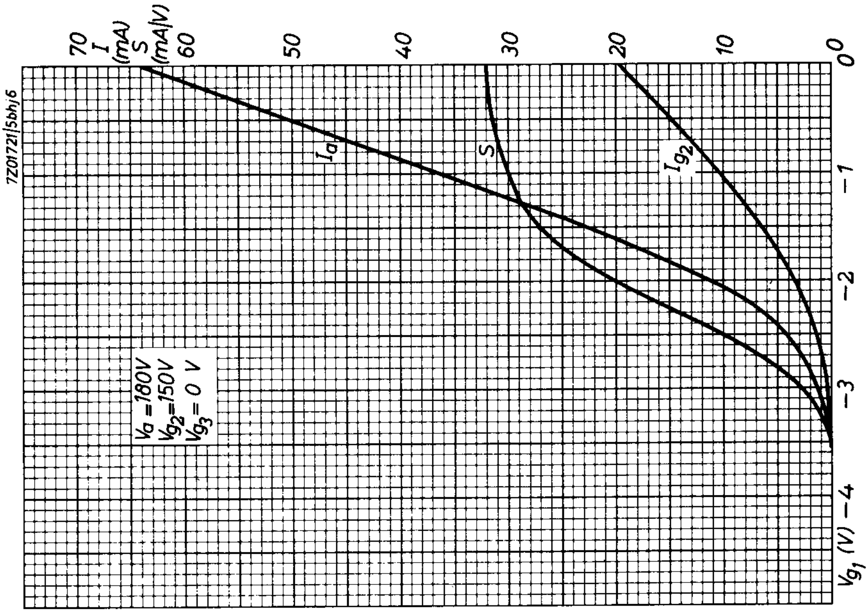
Anode voltage	V_{a_o}	max.	400	V
	V_a	max.	220	V
Anode dissipation	W_a	max.	4	W
Grid No.2 voltage	$V_{g_{2o}}$	max.	400	V
	V_{g_2}	max.	180	V
Grid No.2 dissipation	W_{g_2}	max.	1.1	W
Cathode current	I_k	max.	30	mA
Grid No.1 current	I_{g_1}	max.	5	mA
Grid No.1 voltage negative	$-V_{g_1}$	max.	50	V
positive	$+V_{g_1}$	max.	2	V
Grid No.1 resistor	R_{g_1}	max.	0.5	MΩ
Voltage between cathode and heater				
cathode positive	$V_{kf (k\ pos)}$	max.	120	V
cathode negative	$V_{kf (k\ neg)}$	max.	60	V
Bulb temperature	t_{bulb}		180	°C

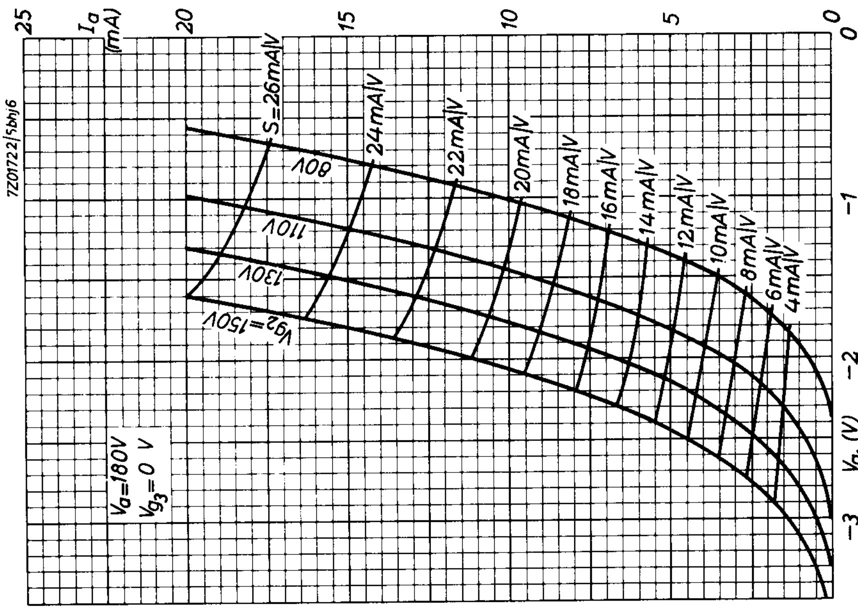
Heater voltage: The average heater voltage should be 6.3 V.
Variation of the heater voltage exceeding the range of 6.0 V to 6.6 V will shorten the tube life.
The tolerance of heater current should be taken into account.

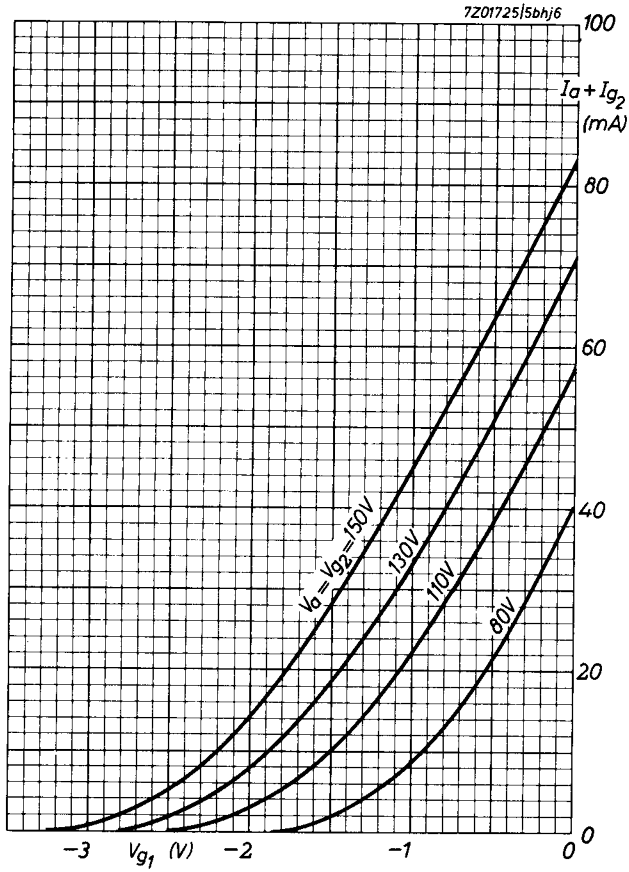
OPERATING CHARACTERISTICS

Anode supply voltage	V_{ba}	190	190	190	190	190	V
Grid No.3 voltage	V_{g_3}	0	0	0	0	0	V
Grid No.2 supply voltage	V_{bg_2}	160	160	160	160	120	V
Grid No.1 supply voltage	$+V_{bg_1}$	8	8	8	9	8	V
Cathode resistor	R_k	370	500	780	630	730	Ω
Anode current	I_a	20	15	10	13.5	10	mA
Grid No.2 current	I_{g_2}	6	4.5	3	4	2.8	mA
Mutual conductance	S	26	23	19	22	20	mA/V
Internal resistance	R_i	100	120	155	130	155	kΩ
Amplification factor	$\mu_{g_2g_1}$	60	58	56	58	56	
Equivalent noise resistance	R_{eq}	220	230	250	240	220	Ω
Input resistance	r_{g_1}	1.4	1.5	1.7	1.6	1.6	kΩ
Pin No.1 connected to pin No.3							
Frequency = 100 MHz							
Capacitance grid No.1 to grid No.2, grid No.3, cathode, heater and screen (no external shield)	C_{g_1/g_2g_3kfs}	15.5	15	14.3	14.8	14.8	pF
	$S/2\pi(C_g+C_a+5\ pF)$	180	162	138	156	142	MHz
	S/C	2.2	1.9	1.6	1.85	1.7	mA/V/pF

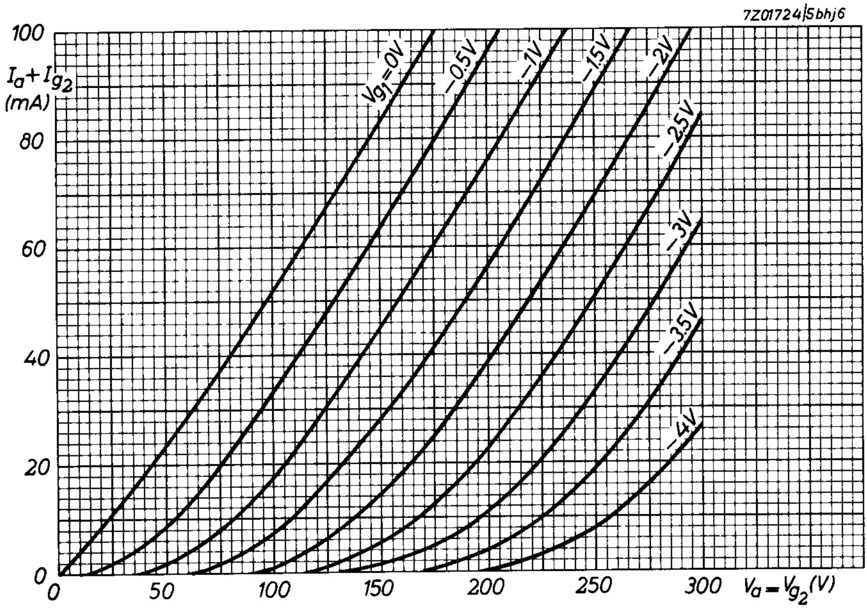

7Z01723/5bhj6
80
60
40
20
0
Ia
(mA)
Vg2=150V
Vg3= 0 V
Vg1=0V
-0.25V
-0.5V
-0.75V
-1V
-1.25V
-1.5V
-1.75V
-2V
-2.25V
-2.5V
0
50
100
150
200
250
Va (V)
300

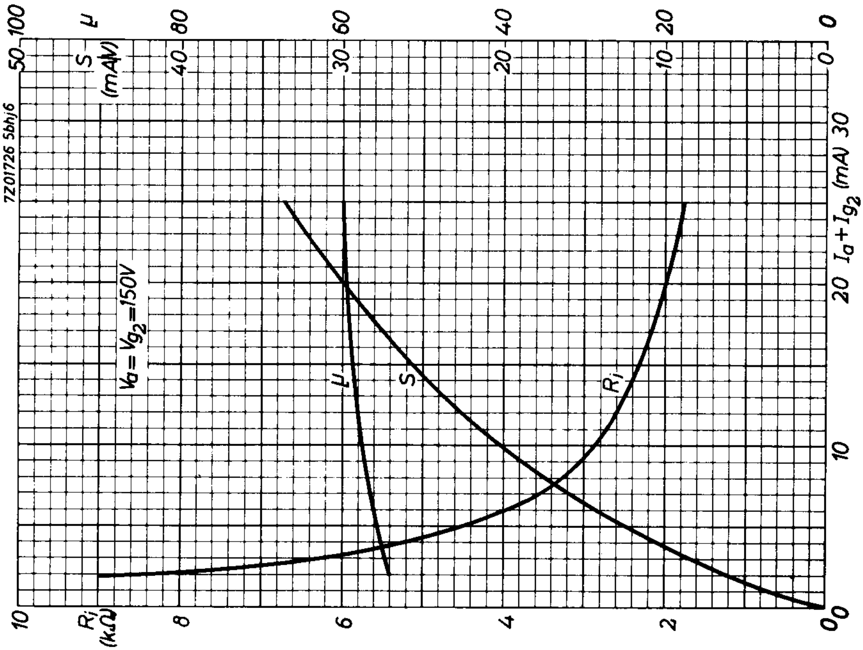

7Z01721/5bhj6
70
I
(mA)
S
(mA/V)
60
50
40
30
20
10
0
0
−1
−2
−3
−4
Vg1 (V)
Ia
S
Ig2
Va = 180V
Vg2 = 150V
Vg3 = 0 V

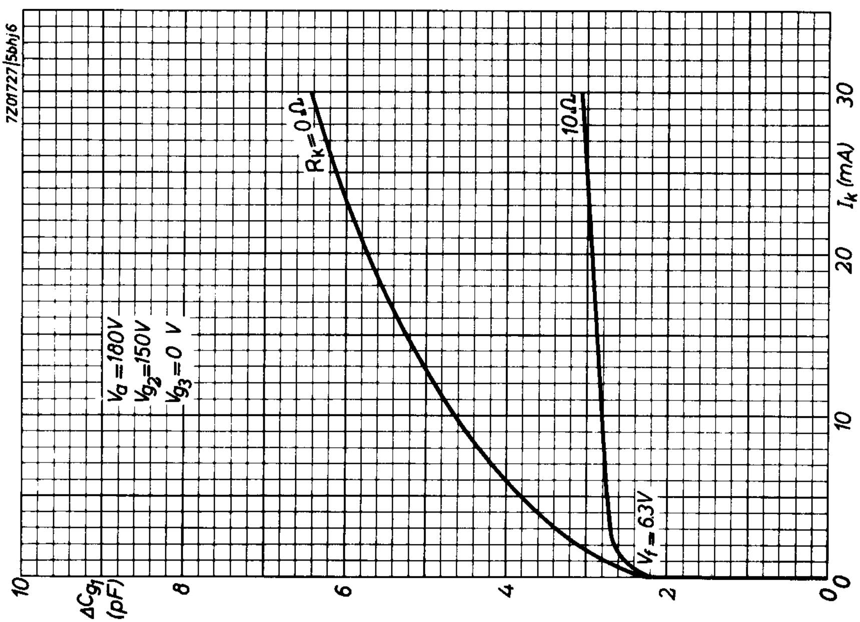

7Z01722/5bhj6
25
Ia
(mA)
20
15
10
5
0
0
−1
−2
−3
Vg1 (V)
S=26mA/V
24mA/V
22mA/V
20mA/V
18mA/V
16mA/V
14mA/V
12mA/V
10mA/V
8mA/V
6mA/V
4mA/V
80V
110V
130V
Vg2=150V
Va=180V
Vg3=0 V



7Z01725/5bhj6
100
$I_a + I_{g_2}$
(mA)
80
60
40
20
0
$V_a = V_{g2} = 150V$
130V
110V
80V
−3
V_{g_1} (V)
−2
−1
0


7Z01724|5bhj6
100
$I_a+I_{g_2}$
(mA)
80
60
40
20
0
0
50
100
150
200
250
300
$V_a=V_{g_2}$(V)
V_{g_1}=0V
−0.5V
−1V
−1.5V
−2V
−2.5V
−3V
−3.5V
−4V


7Z01726 5bhj6
$V_a = V_{g_2} = 150V$
μ
S
R_i
S (mA/V)
R_i (kΩ)
$I_a + I_{g_2}$ (mA)


7Z01727|5bhj6
$V_a = 180V$
$V_{g_2} = 150V$
$V_{g_3} = 0 V$
$R_k = 0\Omega$
10Ω
$V_f = 6.3V$
ΔC_{g_1} (pF)
I_k (mA)

PHILIPS

Data handbook

Electronic components and materials

E280F

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